

REMARKS

This application has been reviewed in light of the Office Action dated December 3, 2003. Claims 1-27 are pending in this application. Claims 1-13, 15-17, 20, and 22-26 have been amended to define still more clearly what Applicants regard as their invention. Claims 1, 17, 20, 22, 25, and 26 are in independent form. Favorable reconsideration is requested.

The Office Action provisionally rejected Claims 1, 13, 14, and 26-27 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1, 5-6, and 13-5 of co-pending U.S. Application No. 09/702,765 ('765). Without agreeing with the propriety of this rejection, Applicants acknowledge this rejection but note that it is only a provisional rejection of the claims, and thus does not require any further response.

The Office Action rejected Claims 1-5, 9-17, 20, 22, and 24 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,254,217 (Askeland et al.); rejected Claims 25-27 under U.S.C. § 103(a) as being unpatentable over Askeland et al. in view of U.S. Patent No. 5,774,146 (Mizutani); and rejected Claims 6-8, 18-19, 21, and 23 under U.S.C. § 103(a) as being unpatentable over Askeland et al. in view of U.S. Patent No. 4,593,295 (Matsufuji et al.). Applicants respectfully traverse these rejections.

Applicants submit that independent Claims 1, 17, 20, 22, 25, and 26, together with the remaining claims dependent thereon, are patentably distinct from the cited prior art at least for the following reasons.

The aspect of the present invention set forth in Claim 1 is a print apparatus which forms a color image by applying ink materials of plural colors onto a print medium, with the print apparatus using a recording means having a plurality of nozzle arrays

arranged along a predetermined direction, the nozzle array having a plurality of nozzles to eject ink materials. The apparatus includes a scanner to scan the recording means in forward scanning and backward scanning directions, along the predetermined direction.

The apparatus also includes a print controller to control the printing so that a printing means executes the printing while the scanner scans the recording means in the forward scanning and the backward scanning directions, and a changing means to change an order of application of the plural ink materials of different colors to each pixel area.

The print controller applies plural ink materials for each pixel area, the pixel area serving as a unit area to form a primary or secondary color thereon. The print controller applies plural ink materials of different colors for forming the secondary color, to each of plural positions on the pixel area, and the changing means can change orders of application of the plural ink materials of different colors to the respective positions on one pixel area.

Among the notable features of Claim 1 is changing the orders of application of plural ink materials to the respective positions on one pixel area. In a print apparatus having the features recited in Claim 1, including the changing means, the orders of overlap of the inks regarding dots of the secondary color formed at the respective plural positions on one pixel area, can be changed.

Askeland et al., as understood by Applicants, relates to an apparatus and method for hue shift compensation in a bi-directional printer. Askeland et al. discusses that mask patterns are used and an order of application of inks for each pixel area in the pattern is determined. However, nothing has been found in Askeland et al. that would teach or suggest changing the order of application of inks, as recited in Claim 1.

Askeland et al. also discusses a structure for controlling pixels to be recorded for each of forward and backward scans using mask patterns, thereby removing color aberration in a bi-directional printing. In Askeland et al., one to three ink drops are applied on one pixel for recording. The number of the ink drops to be applied on the pixel is determined for each of forward and rearward scans by using the masks patterns shown in Figures 8A to 8C.

Figures 11A to 11C of Askeland et al. show orders of deposition of the ink drops when the mask patterns as shown in Figures 8A to 8C are utilized. For example, Figure 11A illustrates the ink drop deposition order when a full page of dark intensity blue is printed. Dark intensity blue is produced by combining dark intensity magenta ("M") and dark intensity cyan ("C"). A circle around "M" and a box around "C" indicate that these drops were actually deposited, as opposed to being potential drops. The drop deposition order is indicated within each column; the earliest deposited drop is at the bottom, and the latest deposited drop is at the top. When a full page of a predetermined color (e.g., blue in Fig. 11A, green in Fig. 11B, and red in Fig. 11C) is printed, pixels to which the ink drops are applied in different ink application orders (as between the respective colors of the three pages) are scattered. However, in recording an actual image, some pixels are not printed (as explained above, these pixels are designated by the letters "M", "C", and "Y" in Figs. 11A-11C that are not encircled or do not have a box around them), so that when an image having a specific dot pattern is printed and the dot pattern is synchronized with the mask pattern, pixels of a specific application order are collectively printed out. Consequently, the various masks patterns (Figs. 8A-8C) used in combination with the print patterns correct for hue shift that would otherwise occur.

In Askeland et al., an order or application of plural ink drops for a given pixel is determined by a mask pattern used according to color and scan direction, and the application order is repeated in units of mask pattern size. Therefore, although an actual order of application of the ink droplets is dependent on data for the target pixel, if the same data is given to each pixel, the order of application of ink drops to one pixel is different from that for another pixel within the pattern size. In other words, Askeland et al. arranges pixels to which the orders of application (or deposition) of inks are changed according to the patterns, i.e., the order of application of inks to each pixel is determined according to the mask pattern; however, Applicants have not found anything in Askeland et al. that would teach or suggest changing the order of application of inks, as recited in Claim 1.

Furthermore, in Askeland et al., the order of application of inks to each pixel is determined in advance, so when the dot pattern of image data to the mask pattern are synchronized (or tuned), the orders of application of inks to one pixel and another pixel are not changed, and thus the orders of application of inks to the two pixels should be equal. In addition, Askeland et al. shows a print head having color nozzles arranged symmetrically (see the specification, column 3, lines 28-31), but again, nothing has been found in Askeland et al. that would teach or suggest changing the order of application of inks, as recited in Claim 1.

Accordingly, Applicants submit that, at least for the reasons described above, Claim 1 is patentable over Askeland et al.

Independent Claim 20 is a method claim and Claim 25 is an apparatus claim that include the same feature of changing the order of application of inks, as recited in Claim 1, and therefore these claims are believed to be patentable for at least the same reasons as discussed above in connection with Claim 1. Additionally, independent Claim

26 is directed to a data buffer that includes the same features of a print controller for controlling a printing of an image by means of a plurality of nozzles and plural dots of a secondary color being recorded on the same pixel, as discussed above in connection with Claim 1. Accordingly, Claim 26 is believed to be patentable for at least the same reasons as discussed above in connection with Claim 1.

The aspect of the present invention set forth in Claim 17 is a print apparatus which forms a color image by applying ink materials of plural colors onto a print medium using a recording means that includes a plurality of nozzle arrays arranged along a predetermined direction, the nozzle array having a plurality of nozzles to eject ink materials. The apparatus includes a scanner to scan along the predetermined direction the recording means in forward scanning and backward scanning directions. A print controller controls the printing by applying plural ink materials for each pixel area, the pixel area serving as a unit area to form a color thereon. The orders of application of the plural ink materials of different colors for forming the process color, to the respective positions on one pixel area, are made symmetric.

Among the notable features of Claim 17 is that the order of application of the plural ink materials are made symmetric.

The Office Action at page 3 states that Askeland et al. discloses that dots of the secondary color to be formed at plural positions on the same pixel area are symmetric (Figure 11B, superpixel 124, wherein an ink dot is formed in symmetric order, i.e., CYYC as shown by each superpixel 124 of the last row). Applicants note that the specification, in regard to Figure 11A and superpixel 124, states at column 13, lines 60-62, that "[w]ithin each printed image pixel 124 there are two columns 126 corresponding to the positions of the two mask values 104. The drop deposition order is indicated within each column; the

earliest deposited drop at the bottom, and the latest deposited drop at the top." Thus, this section discusses the positioning of two mask values in relation to the printed image pixel 124, and nothing in this section, Figure 11B, or any other section of Askeland et al. would teach or suggest that the order of application of the plural ink materials are made symmetric, as recited in Claim 17.

Accordingly, Applicants submit that, at least for this reason, Claim 17 is patentable over Askeland et al.

Independent Claim 22 is a method claim that corresponds to apparatus Claim 17, and is believed to be patentable for at least the same reasons as discussed above in connection with Claim 17.

A review of the other art of record, including Askeland et al. and Mizutani, has failed to reveal anything that, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as applied against the independent claims herein. Therefore, those claims are respectfully submitted to be patentable over the art of record.

The other rejected claims in this application depend from one or another of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and the allowance of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,


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